

WHAT IS CLAIMED IS

1. A regulated power supply having power factor control comprising:
 - a sample voltage linearly related to an output voltage of said regulated power supply; and
 - a multi-vector error amplifier for automatically amplifying said sample voltage at different gains and bandwidths depending on said sample voltage, comprising:
 - a voltage adder for adding at least three voltage signals;
 - a steady-state reference-voltage amplifier, wherein an output of said steady-state reference-voltage amplifier is connected via a low pass filter to a first input of said voltage adder;
 - a low reference-voltage amplifier, wherein an output of said low reference-voltage amplifier is connected via a first diode to a second input of said voltage adder; and
 - a high reference-voltage amplifier, wherein an output of said high reference-voltage amplifier is connected via a second diode to a third input of said voltage adder.
2. The regulated power supply according to claim 1, wherein said steady-state reference-voltage amplifier further comprises a negative input connected to said sample voltage and a positive input connected to a steady-state reference-voltage.
3. The regulated power supply according to claim 1, wherein said low reference-voltage amplifier further comprises a negative input connected to said sample voltage and a positive input connected to a low reference-voltage, and wherein said low reference-voltage is distinctly lower than said steady-state reference-voltage supplied to said steady-state reference-voltage amplifier.
4. The regulated power supply according to claim 1, wherein said high reference-

voltage amplifier further comprises a negative input connected to said sample voltage and a positive input connected to a high reference-voltage, and wherein said high reference-voltage is distinctly higher than said steady-state reference-voltage supplied to said steady-state reference-voltage amplifier.

5. The regulated power supply according to claim 1, wherein the bandwidth of said multi-vector error amplifier is significantly less than the frequency of an input power of the power supply when said sample voltage is less than said high-reference voltage and greater than said low-reference voltage.

6. The regulated power supply according to claim 1, wherein the bandwidth of said multi-vector error amplifier increases significantly and the gain of said multi-vector error amplifier decreases significantly when said sample voltage exceeds said high-reference voltage or decreases below said low-reference voltage.

7. A regulated power supply having power factor control comprising:
a sample voltage linearly related to an output voltage of said power supply; and
a multi-vector error amplifier for automatically amplifying said sample voltage at different gains and bandwidths depending on said sample voltage, comprising:

a voltage adder for adding at least three voltage signals;

a current mirror;

a first current source;

a steady-state reference-voltage amplifier, wherein an output of said steady-state reference-voltage amplifier is connected via a low pass filter and a first diode to a first input of said voltage adder;

a high reference-voltage amplifier, wherein an output of said high reference-voltage amplifier is connected via a second diode to a second input of said voltage adder;

a low reference-voltage amplifier, wherein an output of said low reference-voltage amplifier is connected via a current mirror to a third input of said voltage adder; and

a buffer amplifier, wherein an input of said buffer amplifier is coupled to said sample voltage.

8. The regulated power supply according to claim 7, wherein said steady-state voltage amplifier further comprises a negative input connected to said sample voltage and a positive input connected to a steady-state reference-voltage.

9. The regulated power supply according to claim 7, wherein said low pass filter includes a first resistor and a capacitor.

10. The regulated power supply according to claim 7, wherein said buffer amplifier further comprises a negative input connected to an output of said buffer amplifier.

11. The regulated power supply according to claim 7, wherein said high reference-voltage amplifier further comprises a positive input connected to a high reference-voltage, and wherein said high reference-voltage is distinctly higher than the steady-state reference-voltage supplied to said steady-state reference-voltage amplifier.

12. The regulated power supply according to claim 7, wherein said high reference-voltage amplifier further comprises a negative input connected to an output of said buffer amplifier via a second resistor, and wherein said negative input is further connected to said output of said high reference-voltage amplifier via a third resistor.

13. The regulated power supply according to claim 7, wherein said low reference-voltage amplifier further comprises a positive input connected to a low reference-voltage, and wherein the low reference-voltage is distinctly lower than the steady-state reference-voltage supplied to said steady-state reference-voltage amplifier.

14. The regulated power supply according to claim 7, wherein said low reference-voltage amplifier further comprises a negative input connected to said output of said buffer amplifier via a fourth resistor.

15. The regulated power supply according to claim 7, wherein said voltage adder comprises:

- a second current source connected to a current junction;
- a first input connected to said current junction;
- a second input connected to said current junction;
- a third input connected to said current junction; and
- a means for converting a current into a voltage signal connected to said current junction and an output of said voltage adder.

16. The regulated power supply according to claim 7, wherein said means for converting a current into a voltage signal includes a fifth resistor connected to the ground reference.

17. The regulated power supply according to claim 7, wherein the bandwidth of said multi-vector error amplifier is significantly less than the frequency of an input power of the power supply when said sample voltage is less than said high-reference voltage and greater than said low-reference voltage.

18. The regulated power supply according to claim 7, wherein the bandwidth of said multi-vector error amplifier increases significantly and the gain of said multi-vector error amplifier decreases significantly when said sample voltage exceeds said high-reference voltage or decreases below said low-reference voltage.